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## *Indian Standard*

# RECOMMENDATIONS FOR DIRECTION OF MOVEMENT FOR CONTROL DEVICES OPERATING ELECTRICAL APPARATUS

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**INDIAN STANDARDS INSTITUTION**

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG

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# Indian Standard

## RECOMMENDATIONS FOR DIRECTION OF MOVEMENT FOR CONTROL DEVICES OPERATING ELECTRICAL APPARATUS

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# *Indian Standard*

## RECOMMENDATIONS FOR DIRECTION OF MOVEMENT FOR CONTROL DEVICES OPERATING ELECTRICAL APPARATUS

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 5 November 1973, after the draft finalized by the Switchgear and Controlgear Sectional Committee had been approved by the Electrotechnical Division Council.

**0.2** In preparing this standard, assistance has been derived from Doc: 16 ( Central Office ) 29 and 35 ' Draft Recommendations for standard direction of movement for control devices operating electrical apparatus ' issued by the International Electrotechnical Commission.

**0.3** This standard is aimed at standardizing, in systems employing electrical apparatus, the relationship between the direction of the manual action applied to the control device and the final effect required by this action. This is of particular value where safety is concerned and is specially important where a wrong operating movement may cause damage or where stress is laid on a high operating speed, as for example, in applications involving intermittent drive, such as cranes, trucks and other transport vehicles.

This standard will also be useful for devices likely to be operated by the general public.

**0.4** The term operating direction implies the moving direction of the hand, when operating the control device.

**0.5** It is fully recognized that standard rules for direction of motion cannot be strictly applicable under all circumstances. In many cases, the suitable direction of motion will necessarily depend upon particular conditions of construction and mounting which cannot be foreseen or specified in general rules.

**0.5.1** Sometimes a standard direction will be undeterminable or have no meaning, as in the case of a revolving shaft fitted with a handwheel at either end, or a two-way switch.

**0.5.2** It is evident therefore, that exceptions to the standard rules will occur and shall, therefore, be permitted when required.

## 1. SCOPE

**1.1** This standard covers recommendations for standard direction of movement for control devices operating electrical apparatus and is applicable to manually operated devices, such as, handwheels, handles, knobs, grips, levers, push-buttons, rods and cord, which control the operation of electrical apparatus, such as regulating resistors, controllers and switches. The electrical apparatus so operated may comprise a complete functional unit, or may be a component part of a larger assembly of electrical or nonelectrical equipment, for example, motor, pump and fluidvane. This standard also applies to servomotors and the steering of certain types of electric trucks.

**1.2** Additional requirements may be necessary for controls other than manual controls.

## 2. PRINCIPLE OF IDENTIFICATION

**2.1** The object of this standard is to enable the operator to foresee in general cases, the direction of the effect, which results from an action applied in a given direction to the control device.

**2.1.1** The control devices may be of very different forms, such as grips, handwheels, knurled knobs and push-buttons. As a rule, however, they can only move in one or the other of two opposed directions, for example, motion from left to right or from right to left, from back to front or front to back and rotation clockwise or anticlockwise.

**2.1.2** This standard takes into account, for the most current cases, both the direction of action on the control device, and the final effect intended on the apparatus being operated and classify them in two groups for the most usual cases (see Table 1), it being understood that, unless the convention specified in Table 1, should cause serious disadvantages, any effect belonging to Group 1 shall be obtained by an action classified in Group 1, any effect belonging to Group 2 shall be obtained by an action classified in Group 2.

**2.2** Table 2 gives typical examples of control devices and recommended operating directions. The operating direction is understood to be determined by a person standing at the operating place, for instance, where the figure number is placed in the examples of Table 2.













**2.3** When, for some imperative reason, such as, an existing and widespread practice, these rules cannot be applied, it is particularly recommended that the control devices shall be provided with labels or other indications, specifying clearly the direction of the effect corresponding to the action on the device.

**NOTE**— In the case of doubt of the final effect of the operation, the nature of this effect should be indicated on the operating device (for example, on several similar controllers of one operating post).



**TABLE 1 RELATION OF OPERATION DIRECTION AND THE EFFECT INTENDED**

( Clause 2.1.2 )

NATURE OF CONTROL DEVICE	NATURE OF ACTION		GROUP No. 1 ACTIONS AND ASSOCIATED EFFECTS	GROUP No. 2 ACTIONS AND ASSOCIATED EFFECTS
			Direction or Point of Application of Action	
Handwheel, handle, knurled knob, etc*	Rotation		CLOCKWISE 	ANTICLOCKWISE 
Grip, lever, push-button, etc, essentially straight motion	Vertical motion		UP 	DOWN 
	Right-left		RIGHT 	LEFT 
	Horizontal motion Push-pull		 AWAY FROM THE OPERATOR (PUSH)	 TOWARDS THE OPERATOR (PULL)
Set of two grips, buttons, rods, cords, etc, with opposed actions	one above the other		 ACTION ON UPPER DEVICE	 ACTION ON LOWER DEVICE
	one beside the other	Pressure, traction, etc	 ACTION ON RIGHT DEVICE	 ACTION ON LEFT DEVICE
NATURE OF EXPECTED EFFECT			DIRECTION OF EXPECTED EFFECT	
Modification of a physical quantity ( voltage, current, power, speed, frequency, luminous intensity, temperature, etc )			Increase	Decrease
Change of a condition			Put into service Start Acceleration Closing an electric circuit Ignition	Put out of service Stop Breaking Opening an electric circuit Extinction
Motion in relation to the operator			Up†	Down†
			Right	Left
			Away from the operator	Towards the operator
Motion of the object or the vehicle controlled in relation to the axis in question			Up	Down
			Right	Left
			Forward	Backward

\*When only part of the periphery of a rotating control device is accessible or visible, as in the case of knurled knob recessed behind a slot provided in a switchboard, or when the axis or rotation is not apparent and the angular displacement is small, the control device is considered as having an essentially straight motion.

†See exception in 3.2.

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**2.4** The above principles apply to control devices having two positions or two directions of motion, but they may be readily extended to devices with three actions, controlling, for example, motion in direction, the stop, and motion in the other direction.

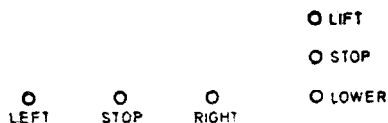
**2.4.1** For handwheels, handles, grips, levers, etc, the indications of Table 1 are applicable to the two directions of movement and the position corresponding to stop is in the middle.

**2.4.2** For sets of three buttons, rods, etc, the following two alternatives are possible:

- a) maintain the conventional position of the stop button at the bottom or on the left, for example:



- b) or position the buttons to correspond with the directions of movement as above on both sides of the stop button, for example:



### 3. SPECIAL RECOMMENDATIONS

**3.1** To move an object in direction other than shown in Table 1, the hand should be moved essentially in the direction of the movement desired of the object.

**3.2** To lift or to lower an object by means of a lever, for which the motion of the hand is practically horizontal, a practice contrary to the recommendation given in Table 1 is usual (see Fig. 1).

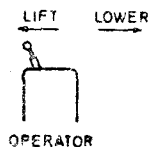


FIG. 1

**3.3** In the case of outdoor isolating switches with a vertical operating shaft having a rotating movement of about  $180^\circ$  the rules for handwheels should be applied in accordance with existing practice. Number 12 of Table 2 applies also in this case to a vertical shaft with the handwheel placed at its lower end.

**3.4** For handwheels, situated partly in enclosures (number 24 and 34 of Table 2) the basic rules for levers be applied.

#### **4. MECHANICAL LOCKING DEVICES FOR HANDLES AND HANDWHEELS**

**4.1** Mechanical locking devices placed on handles or handwheels of electrical appliances, designed to prevent unintended operation of switches, starters or the like as an exception to the rules of Table 1 'Put into service', may be obtained by pulling towards the operator ( *see* Fig. 2 ).

An identification for operation towards the operator, for example, a dot in a circle should be placed on the handle to signify the pulling direction for unlocking.

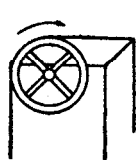


**FIG. 2**

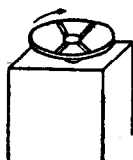
This rule applies to control devices associated with electrical appliances which are only operated occasionally and which are important with regard to safety. It does not apply to control devices intended to be operated by skilled persons in those cases where a convenient operation is of great importance, for example, dead man's button on a lever and levers for controllers.

**TABLE 2 EXAMPLES OF CONTROL DEVICES AND RECOMMENDED  
OPERATING DIRECTIONS***( Clauses 2.2, 3.3 and 3.4 )*

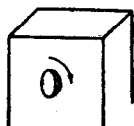
( The operator is considered to be in the place of the figure numbers. Arrows are related to the action Group I. )



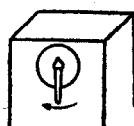
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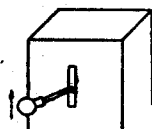
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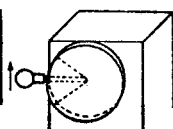
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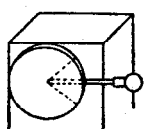
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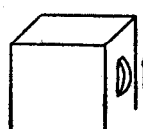
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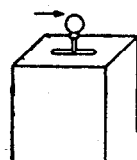
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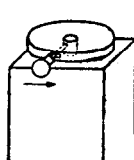
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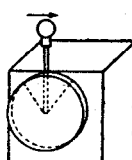
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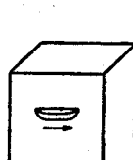
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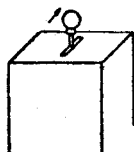
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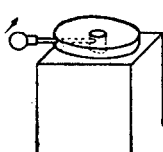
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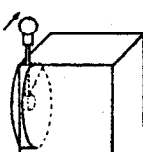
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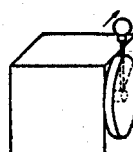
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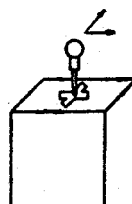
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43



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40



51



61



62